

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-76. (Canceled)

77. (New) A method of removing photoresist and/or resist residue from a semiconductor substrate, comprising the steps of:

- selecting a first co-solvent mixture operable to dissolve the photoresist and/or resist residue without damaging the semiconductor substrate and any semiconductor device structures thereon;

- selecting a supercritical fluid operable to decrease a surface tension of the first co-solvent mixture;

- exposing the photoresist to the first co-solvent mixture and the supercritical fluid for an amount of time necessary to strip the photoresist from the semiconductor substrate, the supercritical fluid carrying the first co-solvent mixture into any high aspect features of the semiconductor substrate;

- directing a flow of supercritical fluid toward the semiconductor substrate in order to remove a substantial portion of the first co-solvent mixture;

- selecting a second co-solvent mixture operable to remove any photoresist by-products and dry the semiconductor substrate; and

- exposing the semiconductor substrate to the second co-solvent and the supercritical fluid in order to substantially remove any remnants of the first co-solvent mixture and the photoresist removal by-products, as well as to dry the substrate.

78. (New) A method according to claim 77, wherein:

- the first co-solvent mixture includes at least one organic solvent operable to strip the photoresist.

79. (New) A method according to claim 78, wherein:
the at least one organic solvent is selected from the group consisting of alcohols, amides, amines, carbonates, chlorinated hydrocarbons, ester solvents, ethers, glycols, glycol ethers, glycol ether esters, ketones, lactams, sulfur-based solvents, and mixtures thereof.
80. (New) A method according to claim 77, wherein:
the first co-solvent mixture includes an oxidizer operable to dissolve cross-linked bonds in the photoresist.
81. (New) A method according to claim 80, wherein:
the oxidizer is selected from the group consisting of hydrogen peroxide, benzoyl peroxide, urea peroxide, and mixtures thereof.
82. (New) A method according to claim 80, wherein:
the oxidizer is 10-80% hydrogen peroxide by volume.
83. (New) A method according to claim 77, wherein:
the first co-solvent mixture includes an organic solvent and an oxidizer mixed in a ratio to form a single-phase solution.
84. (New) A method according to claim 77, wherein:
the first co-solvent mixture further includes at least one of a buffering agent, a corrosion inhibitor, a chelating agent, and a surfactant.
85. (New) A method according to claim 77, wherein:
the second co-solvent mixture includes isopropyl alcohol.
86. (New) A method according to claim 77, wherein:
the second co-solvent mixture includes an alcohol selected from the group consisting of alkyl alcohols and lower monohydroxy alcohols.

87. (New) A method according to claim 77, further comprising:
heating the first co-solvent mixture and the supercritical fluid to a predetermined temperature.
88. (New) A method according to claim 77, wherein:
the supercritical fluid is further operable to increase reaction kinetics of the first co-solvent mixture.
89. (New) A method according to claim 77, further comprising:
repeating the steps of directing a flow of supercritical fluid toward the semiconductor substrate and exposing the semiconductor substrate to the second co-solvent and the supercritical fluid.
90. (New) A method according to claim 77, wherein:
the second co-solvent is at room temperature.
91. (New) A method according to claim 77, further comprising:
directing a flow of supercritical fluid toward the semiconductor substrate in order to remove a substantial portion of the second co-solvent mixture.
92. (New) A method according to claim 77, wherein:
the photoresist is removed without pressure-cycling.
93. (New) A method according to claim 77, wherein:
the first co-solvent mixture further includes an accelerator operable to increase an ability of the first co-solvent mixture to dissolve photoresist and/or resist residue.
94. (New) A method according to claim 93, wherein:
the accelerator is selected from the group consisting of C₁-C₂₂ carboxylic acid, formic acid, acetic acid, oxalic acid, citric acid, maleic acid, malic acid, lactic acid,

glycolic acid, L-tartaric acid, organoamine, diethanolamine, diglycolamine, ethylene diamine, isopropyl amine, monoethanol amine, morpholine, and triethanolamine, salt, solvents, ammonium carbamate, ammonium carbonate, ammonium formate, and hydroxy propyl carbamate.

95. (New) A method according to claim 77, wherein:
the supercritical fluid is supercritical carbon dioxide.

96. (New) A method of removing layers of photoresist from a semiconductor substrate, comprising the steps of:

- selecting a co-solvent mixture operable to dissolve the photoresist without damaging the semiconductor substrate and any semiconductor device structures thereon;
- selecting a supercritical fluid operable to decrease a surface tension of the first co-solvent mixture such that a combination of the first co-solvent mixture and the supercritical fluid can wet any surface of the photoresist and semiconductor substrate;
- selecting an oxidizer for inclusion in the first co-solvent mixture that is operable to dissolve bonds in the photoresist such that the co-solvent mixture, when wetting the surface, dissolves the photoresist by layer; and
- exposing the photoresist to the co-solvent mixture, with the oxidizer, and the supercritical fluid for an amount of time necessary to strip each layer of the photoresist from the semiconductor substrate, the supercritical fluid carrying the first co-solvent mixture and the oxidizer into any high aspect features of the semiconductor substrate.

97. (New) A method according to claim 96, wherein:
the co-solvent mixture includes at least one organic solvent operable to strip the photoresist.

98. (New) A method according to claim 97, wherein:
the at least one organic solvent is selected from the group consisting of alcohols, amides, amines, carbonates, chlorinated hydrocarbons, ester solvents, ethers, glycols,

glycol ethers, glycol ether esters, ketones, lactams, sulfur-based solvents, and mixtures thereof.

99. (New) A method according to claim 96, wherein:
the oxidizer is selected from the group consisting of hydrogen peroxide, benzoyl peroxide, urea peroxide, and mixtures thereof.
100. (New) A method according to claim 96, wherein:
the oxidizer is 10-80% hydrogen peroxide by volume.
101. (New) A method according to claim 96, further comprising:
heating the co-solvent mixture and the supercritical fluid to a predetermined temperature.
102. (New) A method according to claim 96, wherein:
the supercritical fluid is further operable to increase reaction kinetics of the co-solvent mixture.
103. (New) A method according to claim 96, wherein:
the photoresist is removed without pressure-cycling.
104. (New) A method according to claim 96, wherein:
the co-solvent mixture further includes an accelerator operable to increase an ability of the co-solvent mixture to dissolve photoresist and/or resist residue.
105. (New) A method according to claim 104, wherein:
the accelerator is selected from the group consisting of C₁-C₂₂ carboxylic acid, formic acid, acetic acid, oxalic acid, citric acid, maleic acid, malic acid, lactic acid, glycolic acid, L-tartaric acid, organoamine, diethanolamine, diglycolamine, ethylene diamine, isopropyl amine, monoethanol amine, morpholine, and triethanolamine, salt,

solvents, ammonium carbamate, ammonium carbonate, ammonium formate, and hydroxy propyl carbamate.

106. (New) A method according to claim 96, wherein:
the supercritical fluid is supercritical carbon dioxide.
107. (New) A method of removing photoresist and/or resist residue from a semiconductor substrate, comprising the steps of:
selecting a first co-solvent mixture operable to dissolve the photoresist and/or resist residue without damaging the semiconductor substrate and any semiconductor device structures thereon;
selecting a surfactant operable to decrease a surface tension of the first co-solvent mixture;
exposing the photoresist at ambient pressure to the first co-solvent mixture and the surfactant for an amount of time necessary to strip the photoresist from the semiconductor substrate, the surfactant allowing the first co-solvent mixture to penetrate into any high aspect features of the semiconductor substrate;
selecting a second co-solvent mixture operable to remove any photoresist by-products and dry the semiconductor substrate; and
exposing the semiconductor substrate to the second co-solvent and a supercritical fluid in order to substantially remove any remnants of the first co-solvent mixture and the photoresist removal by-products, as well as to dry the semiconductor substrate.
108. (New) A method according to claim 107, wherein:
the surfactant is selected from the group consisting of anionic, cationic, non-ionic, and zwitterionic surfactants.
109. (New) A method according to claim 107, wherein:
the first co-solvent mixture includes at least one organic solvent operable to strip the photoresist.

110. (New) A method according to claim 107, wherein:
the at least one organic solvent is selected from the group consisting of alcohols, amides, amines, carbonates, chlorinated hydrocarbons, ester solvents, ethers, glycols, glycol ethers, glycol ether esters, ketones, lactams, sulfur-based solvents, and mixtures thereof.
111. (New) A method according to claim 107, wherein:
the first co-solvent mixture includes an oxidizer operable to dissolve cross-linked bonds in the photoresist.
112. (New) A method according to claim 111, wherein:
the oxidizer is selected from the group consisting of hydrogen peroxide, benzoyl peroxide, urea peroxide, and mixtures thereof.
113. (New) A method according to claim 111, wherein:
the oxidizer is 10-80% hydrogen peroxide by volume.
114. (New) A method according to claim 107, wherein:
the first co-solvent mixture includes an organic solvent and an oxidizer mixed in a ratio to form a single-phase solution.
115. (New) A method according to claim 107, wherein:
the first co-solvent mixture further includes at least one of a buffering agent, a corrosion inhibitor, and a chelating agent.
116. (New) A method according to claim 107, wherein:
the second co-solvent mixture includes isopropyl alcohol.
117. (New) A method according to claim 107, wherein:
the second co-solvent mixture includes an alcohol selected from the group consisting of alkyl alcohols and lower monohydroxy alcohols.

118. (New) A method according to claim 107, further comprising:
heating the first co-solvent mixture and the supercritical fluid to a predetermined temperature.
119. (New) A method according to claim 107, wherein:
the supercritical fluid is further operable to increase reaction kinetics of the first co-solvent mixture.
120. (New) A method according to claim 107, wherein:
the second co-solvent is at room temperature.
121. (New) A method according to claim 107, wherein:
the photoresist is removed without pressure-cycling.
122. (New) A method according to claim 107, wherein:
the first co-solvent mixture further includes an accelerator operable to increase an ability of the first co-solvent mixture to dissolve photoresist and/or resist residue.
123. (New) A method according to claim 122, wherein:
the accelerator is selected from the group consisting of C₁-C₂₂ carboxylic acid, formic acid, acetic acid, oxalic acid, citric acid, maleic acid, malic acid, lactic acid, glycolic acid, L-tartaric acid, organoamine, diethanolamine, diglycolamine, ethylene diamine, isopropyl amine, monoethanol amine, morpholine, and triethanolamine, salt, solvents, ammonium carbamate, ammonium carbonate, ammonium formate, and hydroxy propyl carbamate.
124. (New) A method according to claim 107, wherein:
the supercritical fluid is supercritical carbon dioxide.